

WHAT IS CLAIMED IS:

1. A system for flushing a vascular site with a fluid, said system comprising:
  - (I) a three-lumen aspiration catheter comprising:
    - (A) a proximal end;
    - (B) a distal end; and
    - (C) a four-port manifold located at said proximal end, wherein:
      - (i) said four-port manifold comprises at least three ports having luer-type connectors and a fourth port comprising a sealing element for producing a sealing engagement around a tubular element inserted therethrough; and
      - (ii) said proximal and distal ends are separated by a non-coaxial three-lumen tube; and
  - (II) a multilumen delivery catheter inserted inside of one of said three lumens of said first three lumen catheter via said central port, wherein said multilumen delivery catheter is a catheter selected from the group consisting of:
    - (A) a first two-lumen delivery catheter comprising:
      - (i) a proximal end;
      - (ii) a distal end; and
      - (iii) a two-port manifold located at said proximal end, wherein at least one port of said two-port manifold comprises a luer type connector, and said proximal and distal ends are separated by a non-coaxial two-lumen tube; and
    - (B) a second three-lumen delivery catheter comprising:
      - (i) a proximal end;
      - (ii) a distal end; and
      - (iii) a three-port manifold located at said proximal end, wherein, at least two ports of said three-port manifold comprise a luer-type connector, and said proximal and

distal ends are separated by a non-coaxial three-lumen tube.

2. The system according to Claim 1, wherein said delivery multilumen catheter is said first two-lumen delivery catheter.
3. The system according to Claim 1, wherein said delivery multilumen catheter is said second three-lumen delivery catheter.
4. The system according to Claim 1, wherein said sealing element of said fourth port of said aspiration catheter produces a sealing engagement with either said first or second delivery multilumen catheter when inserted therethrough.
5. The system according to Claim 4, wherein said sealing element comprises a Touhy-Borst valve.
6. The system according to Claim 1, wherein said manifold of said delivery multilumen catheter includes a port having a sealing element that forms a sealing engagement with a guidewire when inserted therethrough.
7. The system according to Claim 6, wherein said sealing element comprises Touhy-Borst valve.
8. The system according to Claim 1, wherein one of said ports of said four-port manifold of said multilumen aspiration catheter is in fluid communication with a negative pressure source.
9. The system according to Claim 1, wherein one of said ports of said four-port manifold of said multilumen aspiration catheter is in fluid communication with a balloon inflation mechanism.

10. The system according to Claim 1, wherein one of said ports of said four-port manifold of said multilumen aspiration catheter is in fluid communication with a dissolution solution attenuating solution fluid reservoir.
11. The system according to Claim 1, wherein one of said ports of said manifold of said multilumen delivery catheter is in fluid communication with a dissolution fluid reservoir.
12. The system according to Claim 1, wherein one of said ports of said manifold of said multilumen delivery catheter is in fluid communication with a balloon inflation mechanism.
13. A multilumen aspiration catheter comprising:
- (a) a proximal end;
  - (b) a distal end; and
  - (c) a four-port manifold located at said proximal end, wherein:
    - (i) said four-port manifold comprises at least three ports with luer-type connectors and a fourth port comprising a sealing element that forms a sealing engagement with a tubular element when inserted therethrough; and
    - (ii) said proximal and distal ends are separated by a non-coaxial three-lumen tube.
14. The multilumen aspiration catheter according to Claim 13, wherein a vascular occlusion mechanism is associated with said distal end.
15. The multilumen aspiration catheter according to Claim 14, wherein said vascular occlusion mechanism is a balloon.
16. The multilumen aspiration catheter according to Claim 13, wherein two of said ports of said four-port manifold are in fluid communication with the same lumen of said multilumen catheter.

17. The multilumen aspiration catheter according to Claim 13, wherein said sealing element is a Touhy-Borst valve.
18. The multilumen aspiration catheter according to Claim 13, wherein one of said ports of said four-port manifold of said multilumen aspiration catheter is in fluid communication with a negative pressure source.
19. The multilumen aspiration catheter according to Claim 13, wherein one of said ports of said four-port manifold of said multilumen aspiration catheter is in fluid communication with a balloon inflation mechanism.
20. The multilumen aspiration catheter according to Claim 13, wherein one of said ports of said manifold of said multilumen aspiration catheter is in fluid communication with a dissolution fluid attenuating fluid reservoir.
21. A multilumen delivery catheter comprising:
- (a) a proximal end;
  - (b) a distal end; and
  - (c) a two-port manifold located at said proximal end, wherein:
    - (i) a first port of said two-port manifold comprises a luer-type connector;
    - (ii) a second port of said two-port manifold comprises a sealing element that forms a sealing engagement with a guidewire when inserted therethrough; and
    - (iii) said proximal and distal ends are separated by a non-coaxial two-lumen tube.
22. The multilumen delivery catheter according to Claim 21, wherein one of said two lumens has a substantially circular cross section while the other of said two lumens has a substantially non-circular cross section.
23. The multilumen delivery catheter according to Claim 22, wherein said non-circular cross section lumen has a crescent shaped cross section.

24. The multilumen delivery catheter according to Claim 21, wherein said sealing element is a Touhy-Borst valve.
25. The multilumen delivery catheter according to Claim 21, wherein said first port is in fluid communication with a dissolution fluid reservoir.
26. The multilumen delivery catheter according to Claim 21, wherein a guidewire is present in one of said two lumens.
27. A multilumen delivery catheter comprising:
- (a) a proximal end;
  - (b) a distal end; and
  - (c) a three-port manifold located at said proximal end, wherein:
    - (i) a first and a second port of said three-port manifold comprise a luer-type connector;
    - (ii) a third port of said three-port manifold comprises a sealing element that forms a sealing engagement with a guidewire when inserted therethrough; and
    - (iii) said proximal and distal ends are separated by a non-coaxial three-lumen tube.
28. The multilumen delivery catheter according to Claim 27, wherein a vascular occlusion mechanism is associated with said distal end.
29. The multilumen delivery catheter according to Claim 28, wherein said vascular occlusion mechanism is a balloon.
30. The multilumen delivery catheter according to Claim 26, wherein one of said lumens of said three-lumen tube has a substantially circular cross section while the remaining two lumens have substantially non-circular cross sections.

31. The multilumen delivery catheter according to Claim 26, wherein said sealing element is a Touhy-Borst valve.
32. The multilumen delivery catheter according to Claim 26, wherein said first port is in fluid communication with a dissolution fluid reservoir.
33. The multilumen delivery catheter according to Claim 26, wherein said second port is in fluid communication with a balloon inflation mechanism.
34. The multilumen delivery catheter according to Claim 26, wherein a guidewire is present in one of said three lumens.
35. A kit for use in flushing a vascular site with fluid, said kit comprising: at least one of:
- (I) a three-lumen aspiration catheter comprising:
    - (A) a proximal end;
    - (B) a distal end; and
    - (C) a four-port manifold located at said proximal end, wherein:
      - (i) said four-port manifold comprises at least three ports having luer-type connectors and a fourth port comprising a sealing element for producing a sealing engagement around a tubular element inserted therethrough; and
      - (ii) said proximal and distal ends are separated by a non-coaxial three-lumen tube;
  - (II) a two-lumen delivery catheter comprising:
    - (A) a proximal end;
    - (B) a distal end; and
    - (C) a two-port manifold located at said proximal end, wherein at least one port of said two-port manifold comprises a luer-type connector, and said proximal and distal ends are separated by a non-coaxial two-lumen tube; and
  - (III) three-lumen delivery catheter comprising:

- (A) a proximal end;
- (B) a distal end; and
- (C) a three-port manifold located at said proximal end, wherein, at least two ports of said three-port manifold comprise a luer-type connector, and said proximal and distal ends are separated by a non-coaxial three-lumen tube.

36. The kit according to Claim 35, wherein said kit comprises at least two of said multilumen catheters.

37. The kit according to Claim 36, wherein said kit comprises all of said multilumen catheters.

38. The kit according to Claim 35, wherein said kit further comprises a dissolution fluid or a component(s) thereof.

39. The kit according to Claim 38, wherein said dissolution solution is an acidic solution.

40. The kit according to Claim 35, wherein said kit further comprises a dissolution solution attenuating solution or a component(s) thereof.

41. The kit according to Claim 40, wherein said dissolution solution attenuating solution is a pH elevating solution.

42. The kit according to Claim 41, wherein said pH elevating solution is a buffer solution.

43. The kit according to Claim 35, wherein said kit further comprises a guidewire.

44. The kit according to Claim 43, wherein said guidewire is hollow.

45. The kit according to Claim 35, wherein said kit further comprises a dilator.
46. The kit according to Claim 35, wherein said kit further comprises a recording medium having recorded thereon instructions for using said kit to treat a vascular lesion or mechanism for obtaining said instructions from a remote location.
47. A method for flushing a vascular site with a fluid, said method comprising:
- (a) introducing a system according to Claim 1 into a patient in a manner such that the distal ends of said multilumen catheters of said system are located at said vascular site; and
  - (b) flushing said vascular site with at least one fluid by introducing fluid into and removing fluid from said vascular site through the lumens of said system.
48. The method according to Claim 47, wherein said method is a method for treating a vascular lesion.
49. The method according to Claim 48, wherein said vascular lesion is a calcified vascular lesion.
50. The method according to Claim 47, wherein said method comprises flushing said vascular site with at least an acidic dissolution fluid.
51. The method according to Claim 50, wherein said vascular site is also flushed with a pH elevating solution.
52. The method according to Claim 51, wherein said pH elevating solution is a buffer solution.